

# TECHNOLOGY 2004

## Paper Abstract

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**Paper Title:** Composite Material Properly Nondestructive Characterization Using Obliquely Insonified Ultrasonic Waves

**Category:** Materials Science

**Description:** The analysis of reflected ultrasonic waves induced by oblique insonification of composite materials is a powerful tool for providing information about defects and material properties. A device was developed to manipulate a pair of transmitting and receiving transducers at various angles of wave incidence and propagation with the fiber orientation. The device was designed as a C-scan attachment to allow inspection at specific locations as well as to obtain global information about the laminates by scanning them. Ultrasonic reflections from composite laminates are acquired and analyzed by a personal computer at high speed, in a transient or spectral form. Graphite/epoxy laminates were tested and the experimental results accurately corroborated the analysis of the wave behavior for tone-burst and pulse results. The inversion algorithm allows the determination of the material elastic constants as well as evaluation of various defects characteristics. The data repeatability and accuracy are very high, making Ultrasonic Oblique Insonification easy to standardize for practical applications.